

**Effects of absorbing aerosols on accelerated melting
of snowpack
in the Tibetan-Himalayas region**

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The impacts of absorbing aerosol on melting of snowpack in the Hindu-Kush-Tibetan-Himalayas (HKTH) region are studied using NASA satellite and GEOS-5 GCM. Results from GCM experiments shows that a 8-10% in the rate of melting of snowpack over the western Himalayas and Tibetan Plateau can be attributed to the aerosol elevated-heat-pump (EHP) feedback effect (Lau et al. 2008), initiated by the absorption of solar radiation by absorbing aerosols accumulated over the Indo-Gangetic Plain and Himalayas foothills. On the other hand, deposition of black carbon on snow surface was estimated to give rise to a reduction in snow surface albedo of 2 - 5%, and an increased annual runoff of 9-24%. From case studies using satellite observations and re-analysis data, we find consistent signals of possible impacts of dust and black carbon aerosol in blackening snow surface, in accelerating spring melting of snowpack in the HKHT, and consequentially in influencing shifts in long-term Asian summer monsoon rainfall pattern.